

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 1 of 30

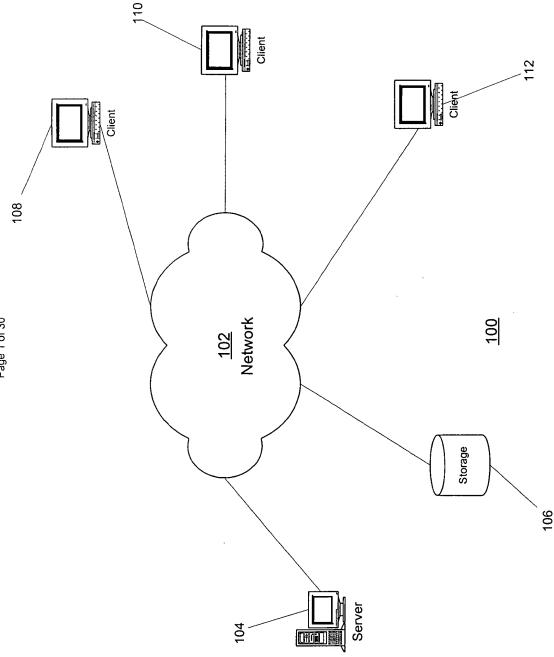
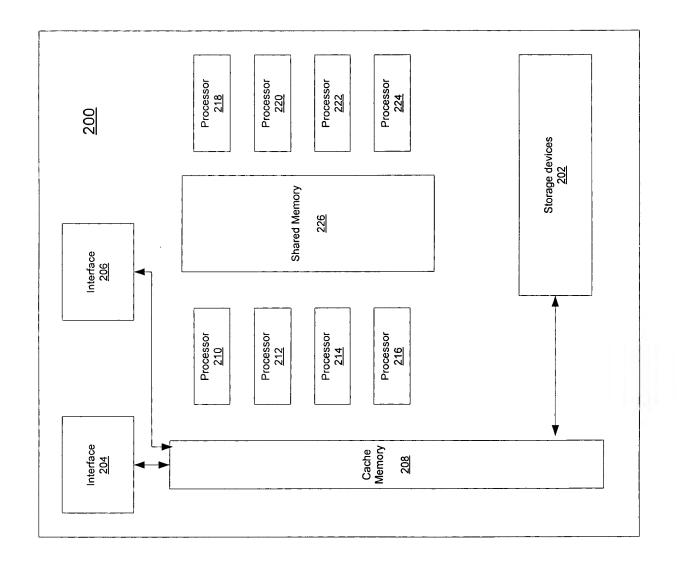


Figure 2
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 2 of 30



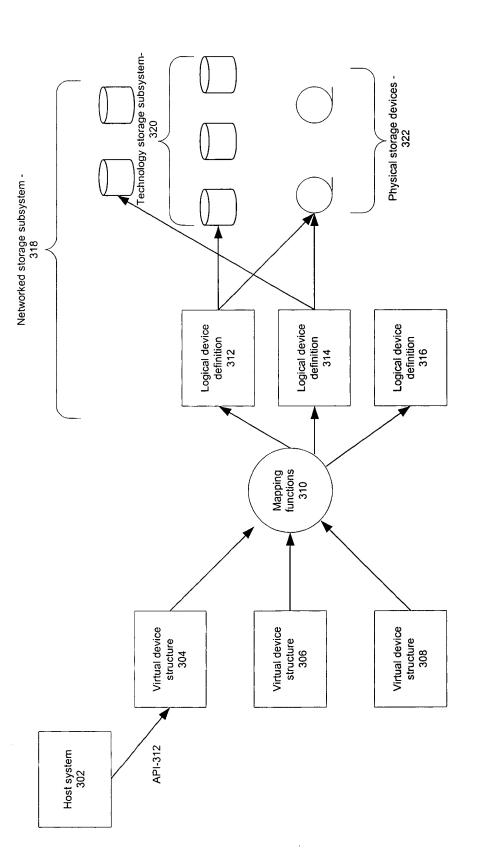


Figure 3
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 3 of 30

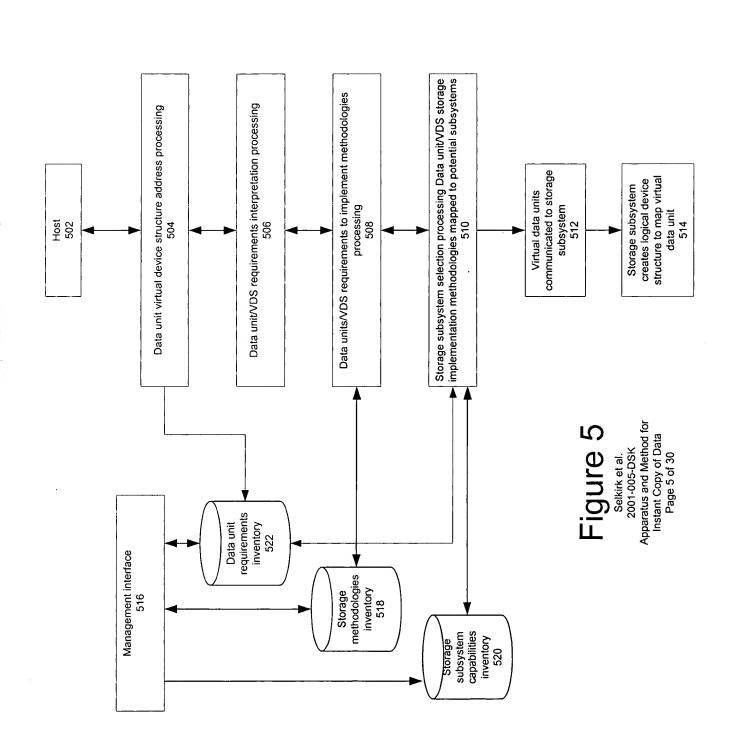
Data - records n_{k+1} through n_x; records ... Data - records nj through nk; records ny+1 through nz RAID stripe group B 404 RAID stripe group A

Figure 4

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 4 of 30

RAID stripe group C

Data - records n_{x+1} through n_y; records



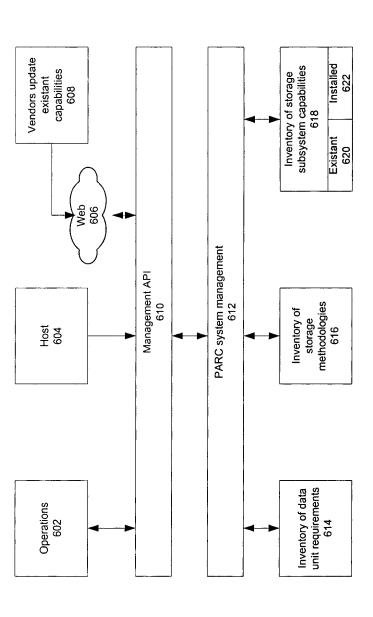
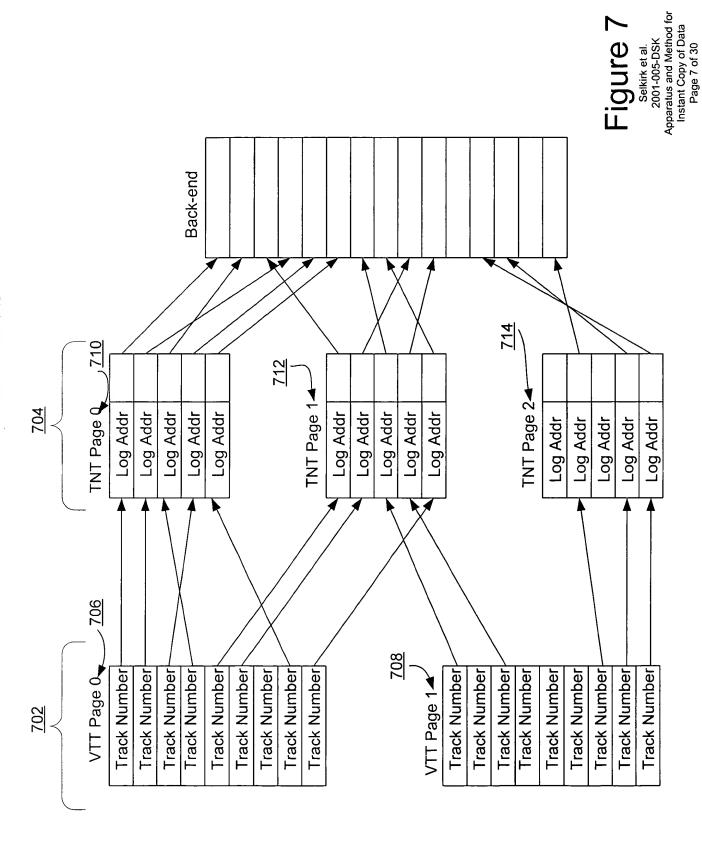


Figure 6

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 6 of 30



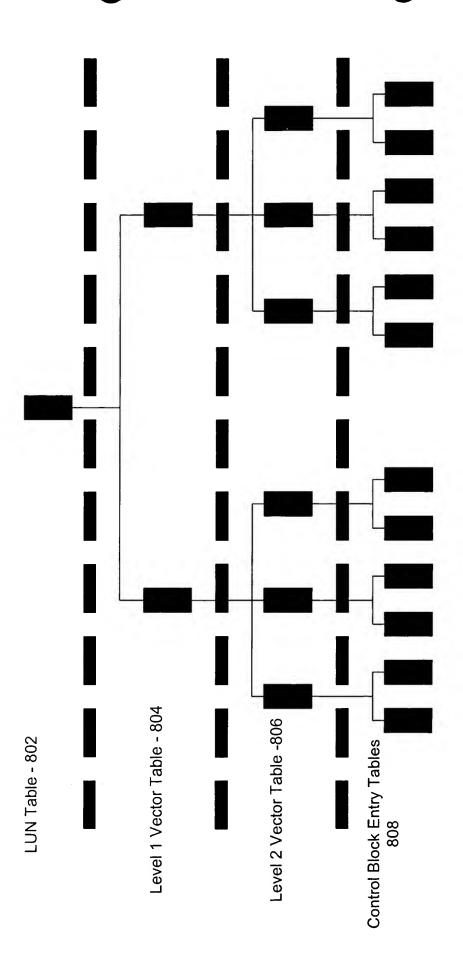


Figure 8
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 8 of 30

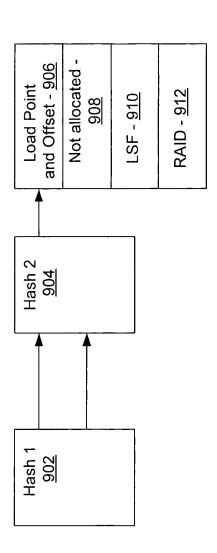
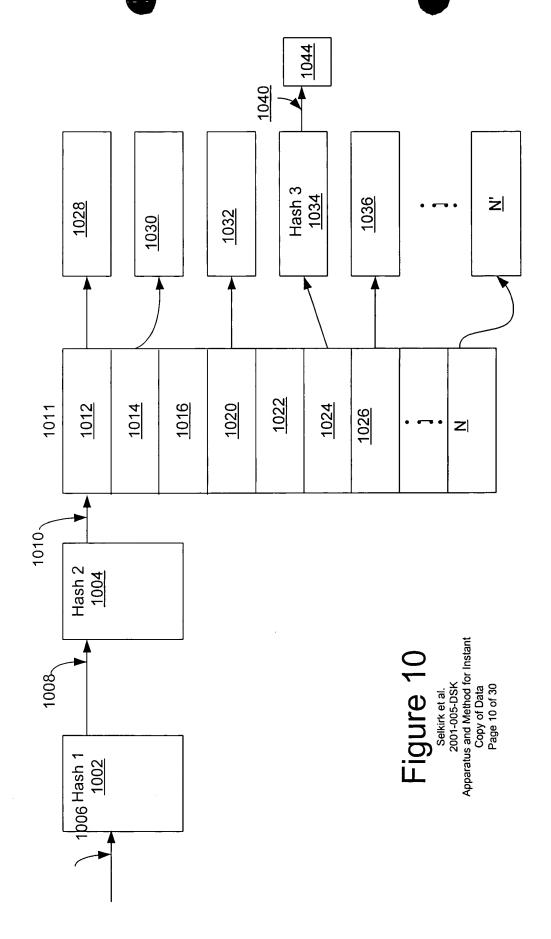


Figure 9

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 9 of 30



Stripe 2 Parity - 1161 Stripe 3 - 1162 Stripe 4 - 1163 Stripe 5M - 1164	Drive - 1160
Stripe 1 Parity - 1151 Stripe 2 - 1152 Stripe 3 - 1153 Stripe 5 - 1154	Drive - 1150
141 142 1143 rity -	40
Stripe 1 - 1141 Stripe 2 - 1142 Stripe 3 - 1143 Stripe 4 Parity - 1144	Drive - 1140
Stripe 1 - 1131 Stripe 2 - 1132 Stripe 3 Parity - 1133 Stripe 4 - 1134	Drive - 1130
Stripe 1 - 1121 Stripe 2 - 1122 Stripe 3 - 1123 Stripe 4 - 1124	Drive - 1120
Stripe 1 - 1111 Stripe 4 - 1112 1113 1114	Drive - 1110

Figure 11
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant
Copy of Data
Page 11 of 30

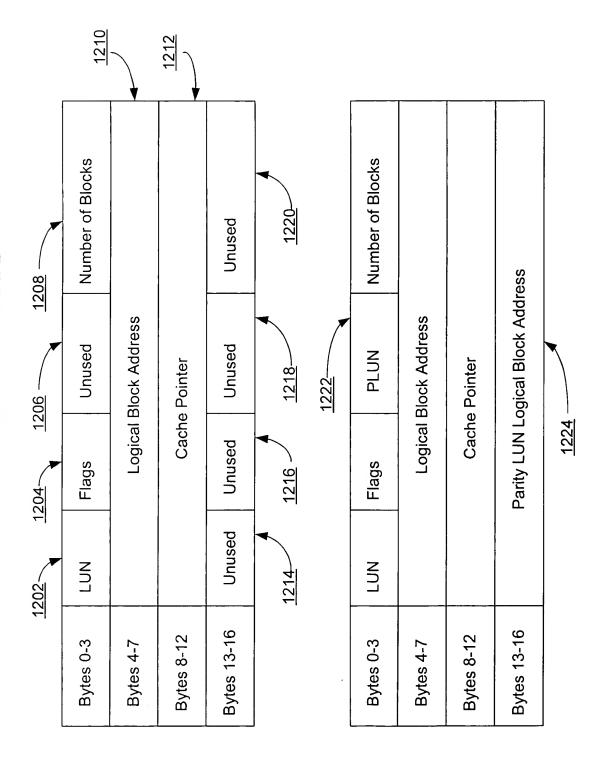
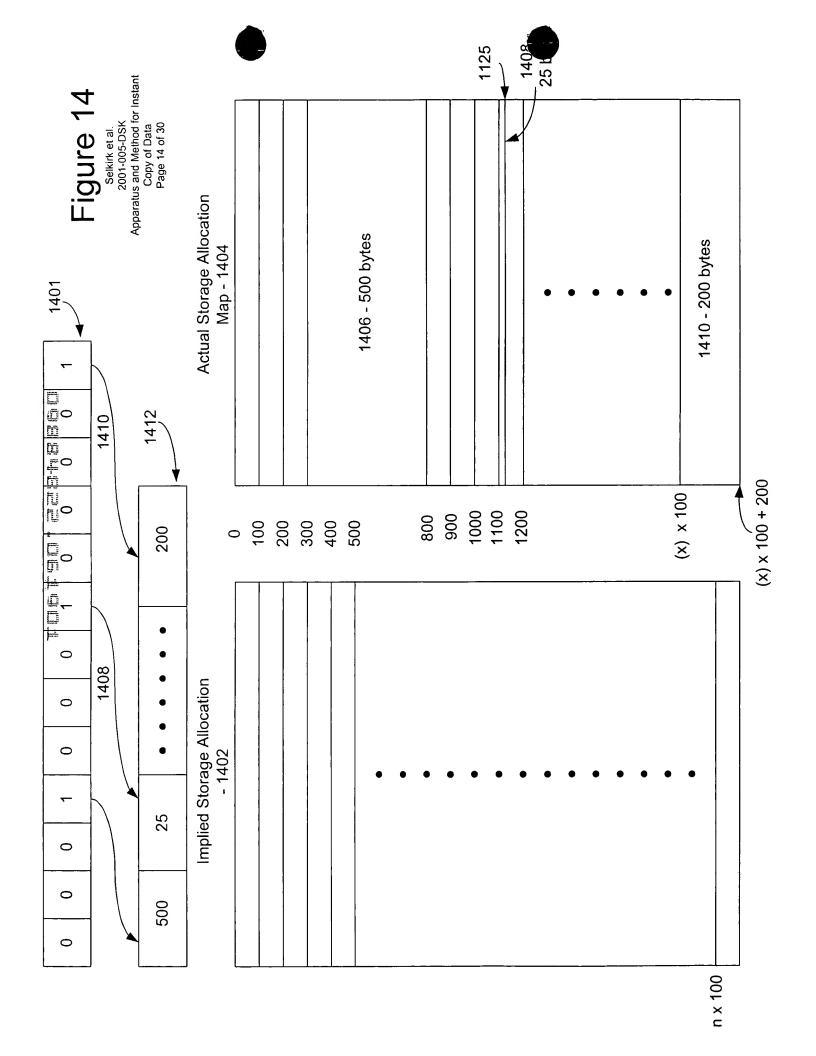


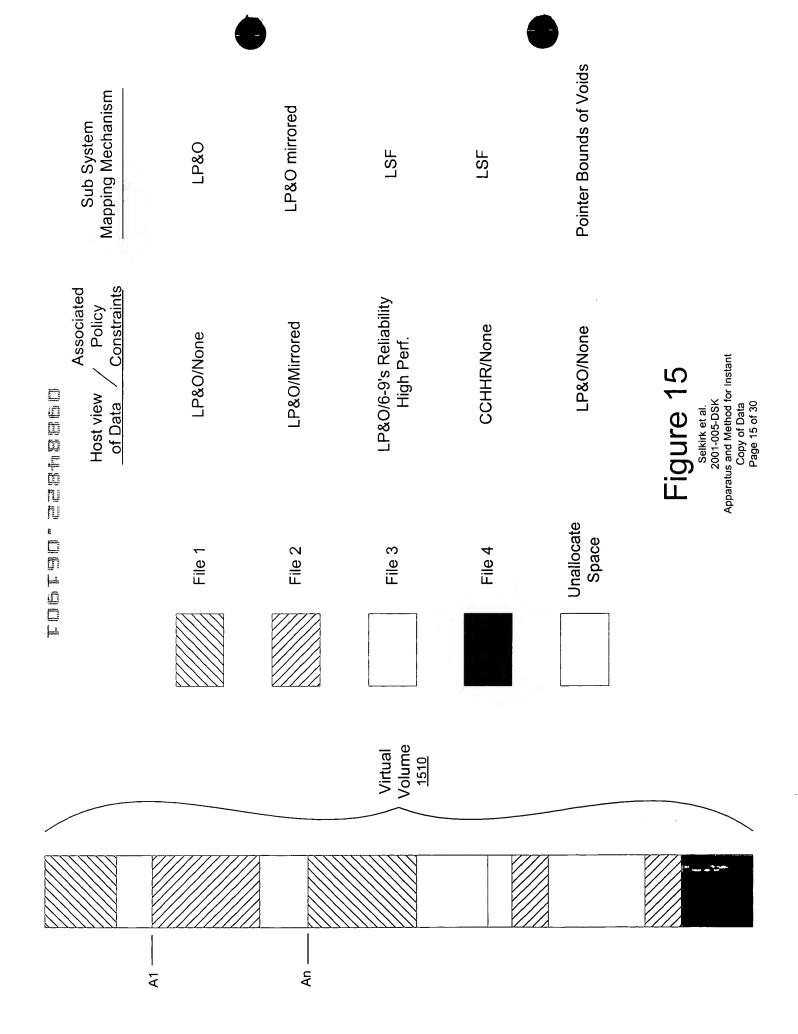
Figure 12

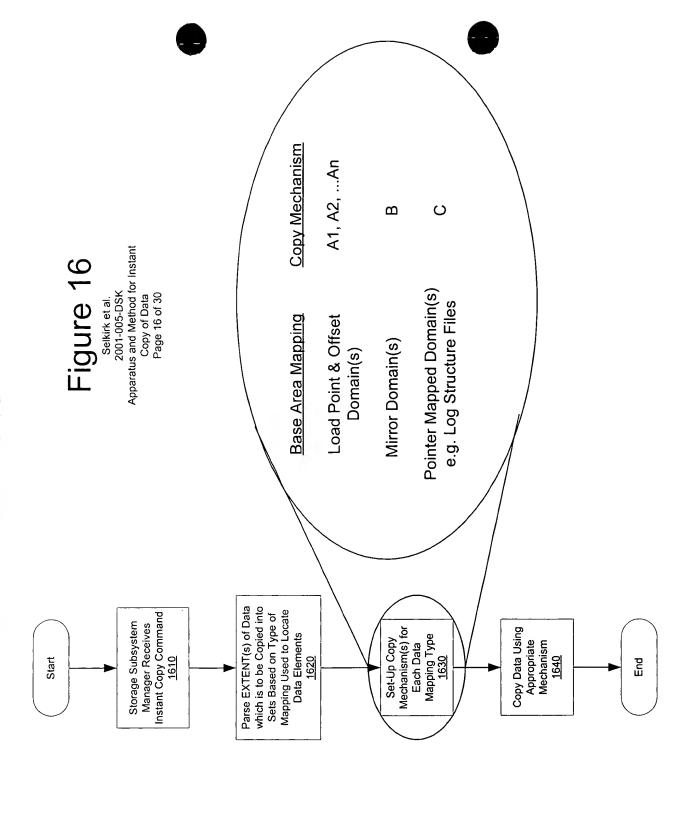
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 12 of 30

:	Timestamp	stamp	
	LBA of prev	LBA of previous stripe	
Previous stripe LUN	Index of parity drive	Previous stripe LUN Index of parity drive RAID type of stripe # of strips in stripe	s in stripe
Strip size in blocks			
1st LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data	LBA of data on 1st LUN	
2nd LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data on 2nd LUN	on 2nd LUN	
Nth LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data on Nth LUN	on Nth LUN	
Host LUN	Length in strip	Host Length	
	Hos	Host LBA	
Host LUN	Length in strip	Host Length	
	Hos	Host LBA	

Figure 13
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 13 of 30







Original Mapping

Instant Copy Meta-Data Type

Full Pointer Table Full Pointer Scheme

Load Point & Offset

Pointer for Changed Blocks Only
A1 - Old Data to New Memory Space
A2 - New Data to New Memory Space

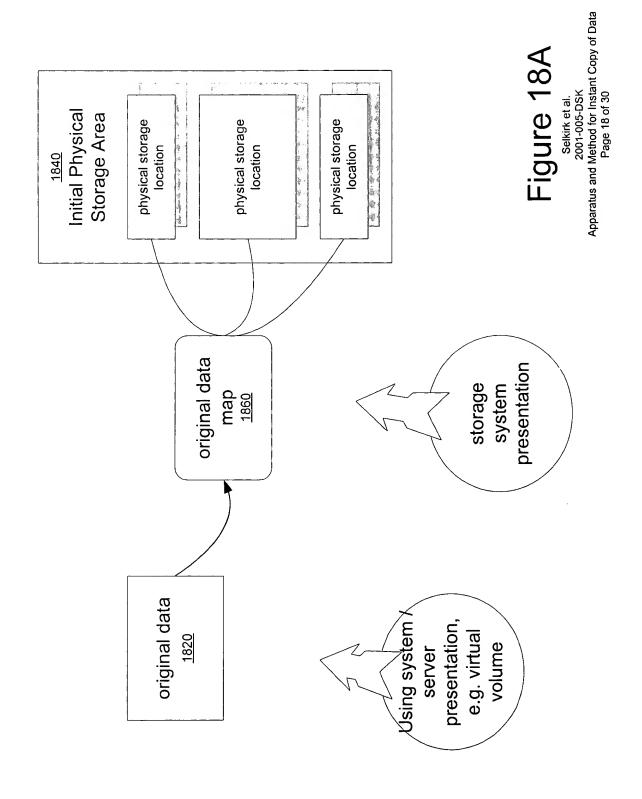
Full Bit Map for Copied Area Old Data to New Memory Space New Data to New Memory Space

Multi-Level Bit Maps

Partial Area Bit Maps (with Extent Definitions & Pointers to Partial Areas)

Figure 17

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 17 of 30



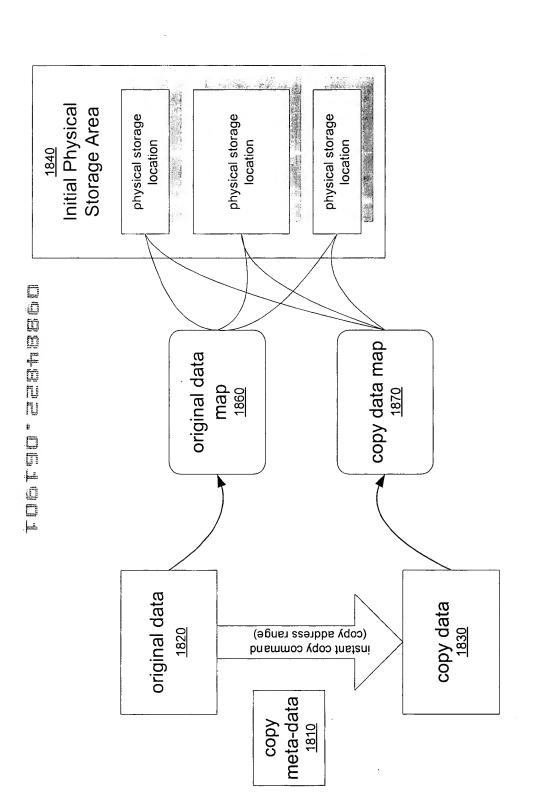
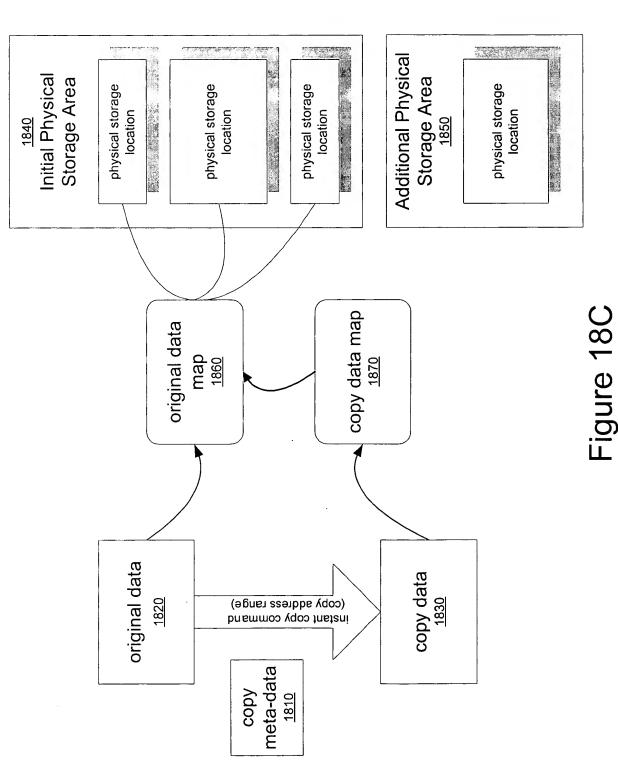


Figure 18B

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 19 of 30



Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 20 of 30

Figure 19

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 21 of 30

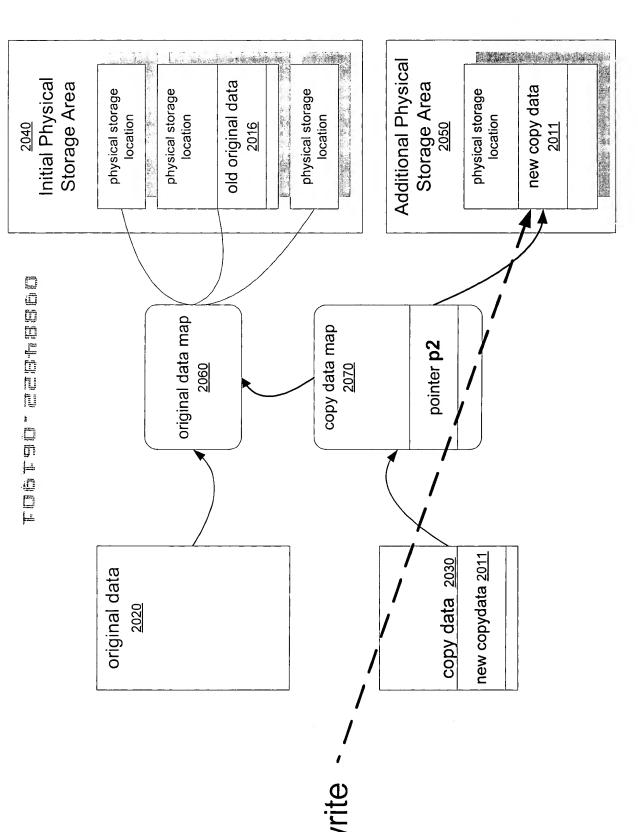
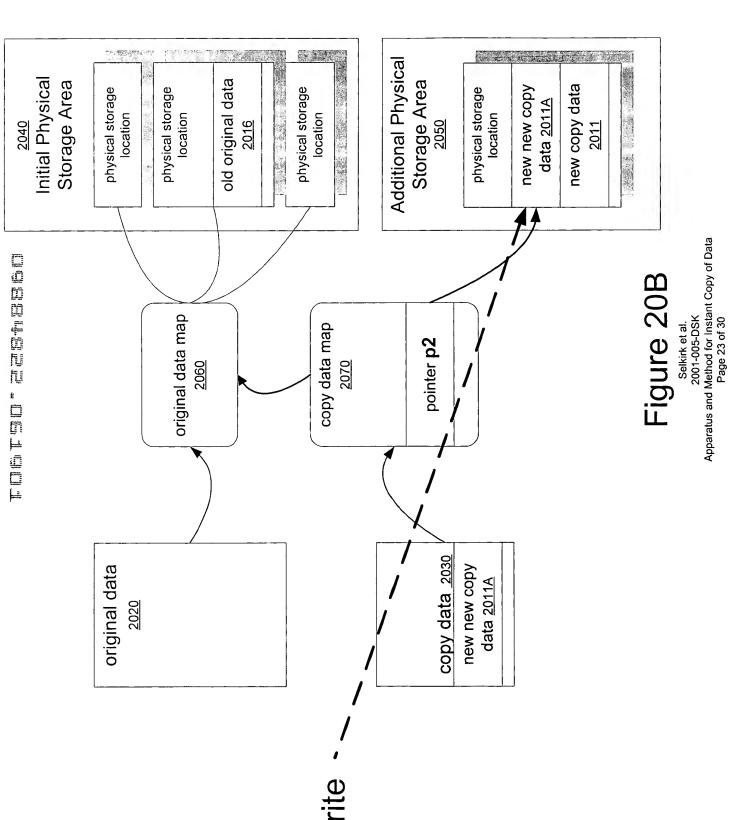
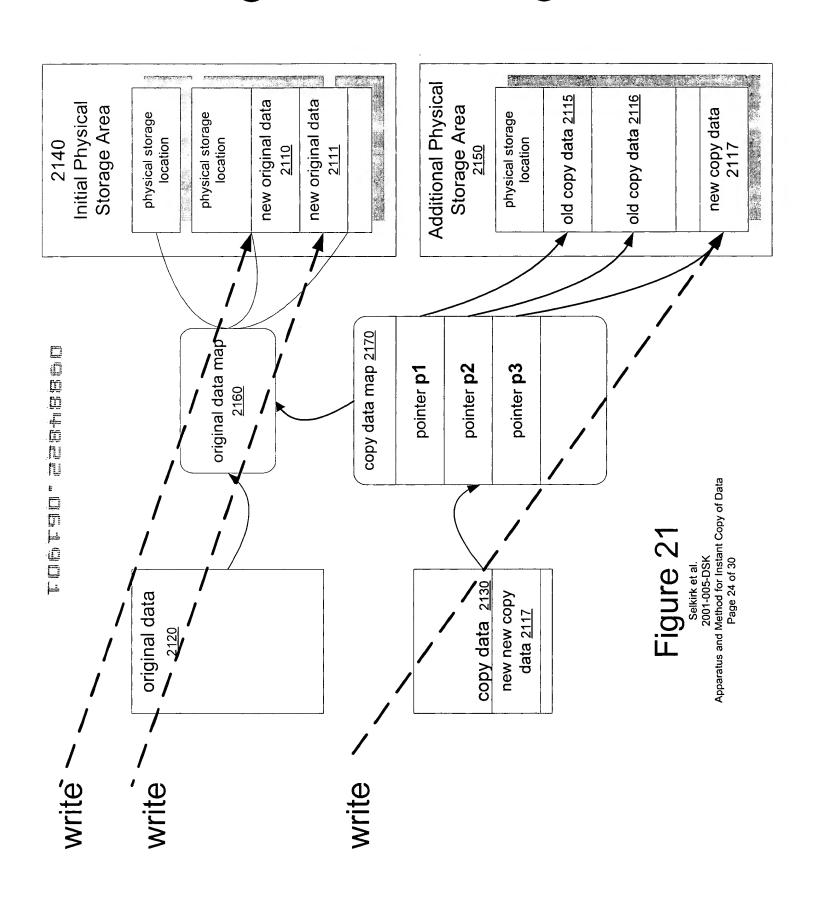
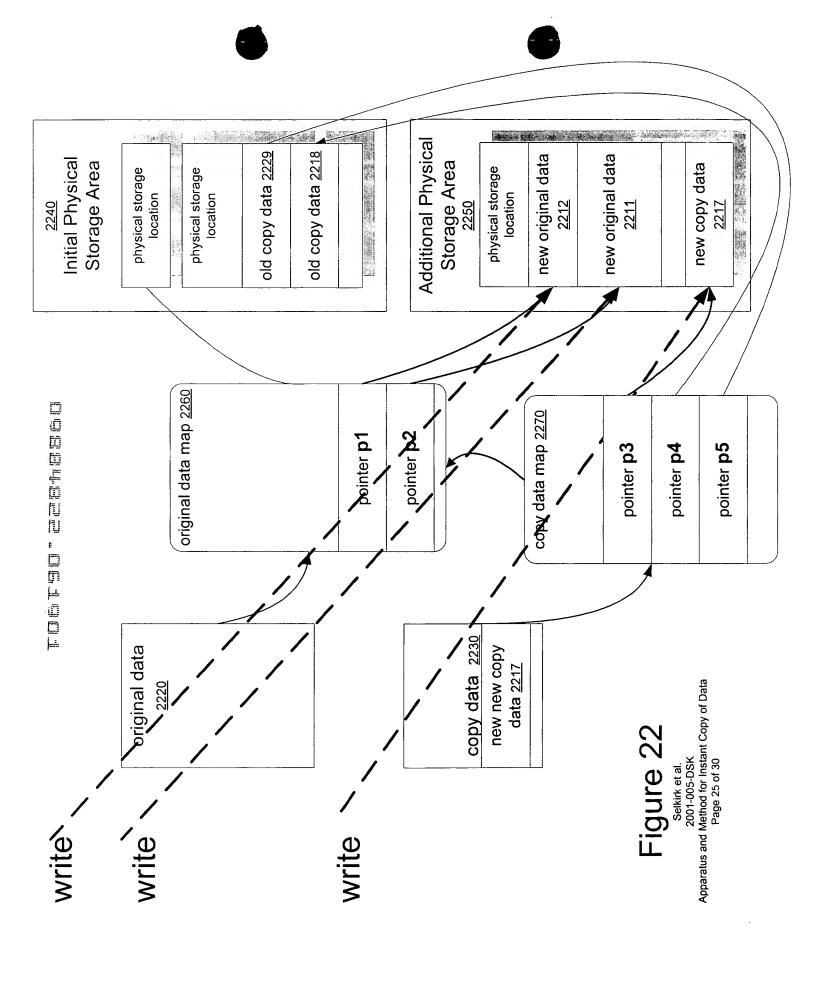


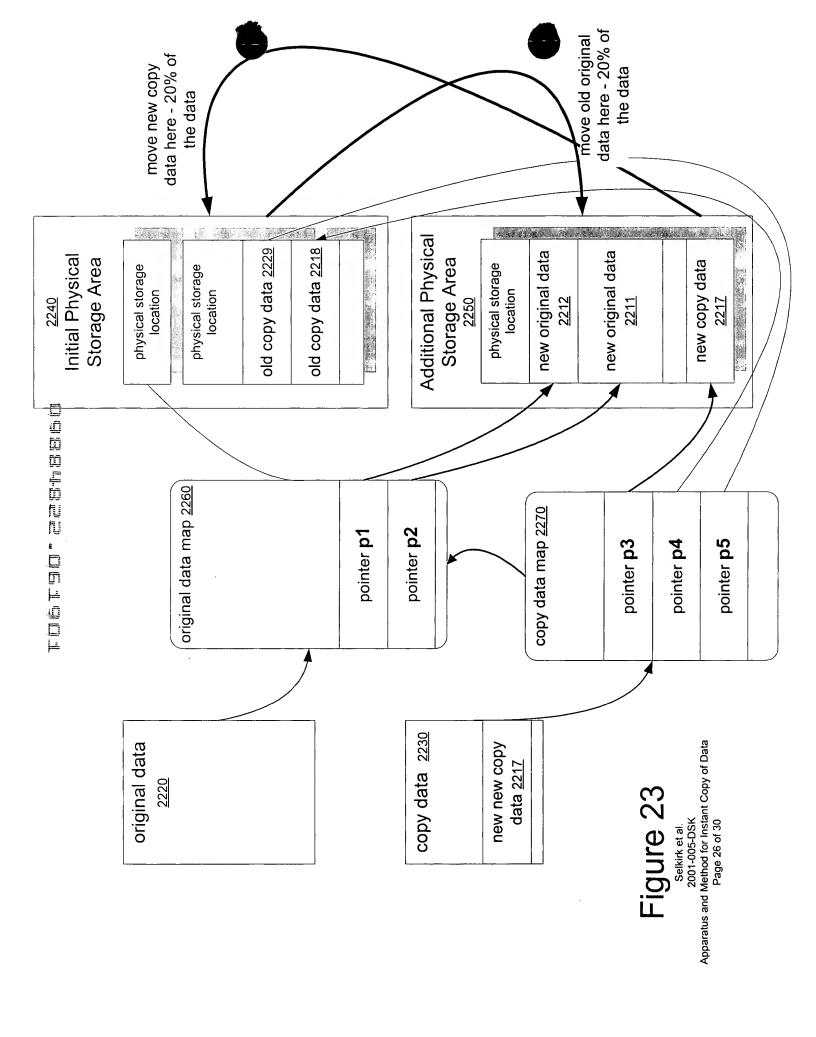
Figure 20A

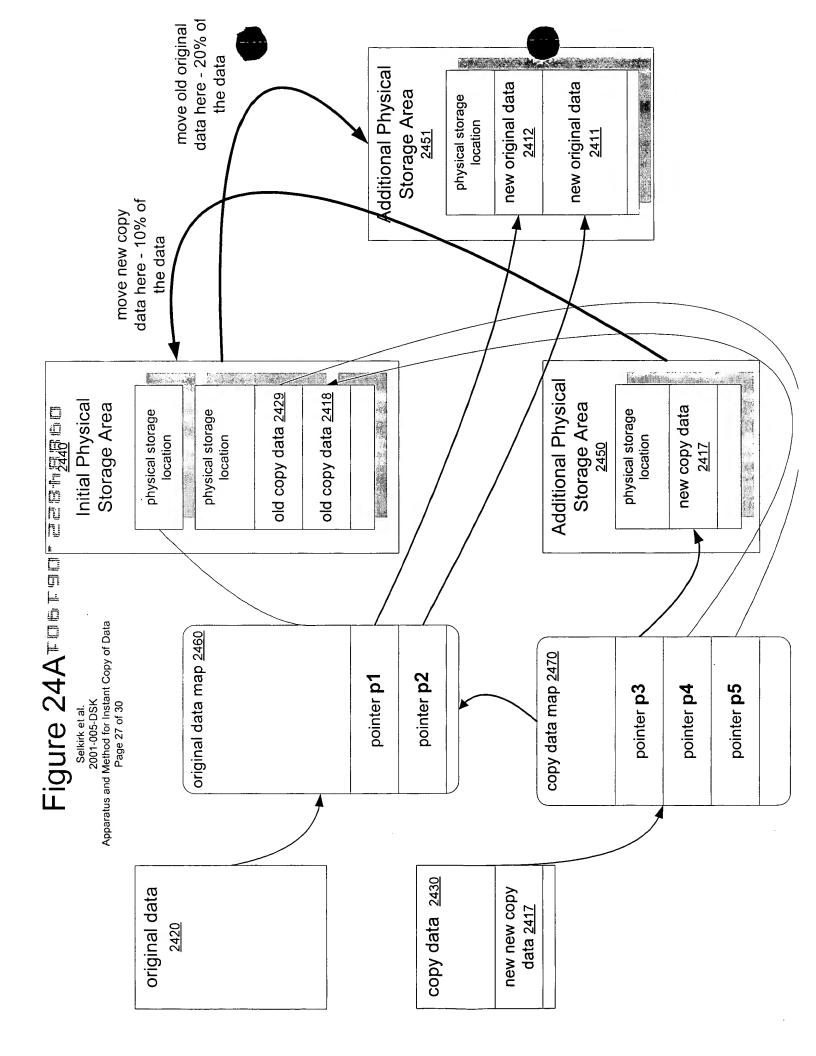
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 22 of 30

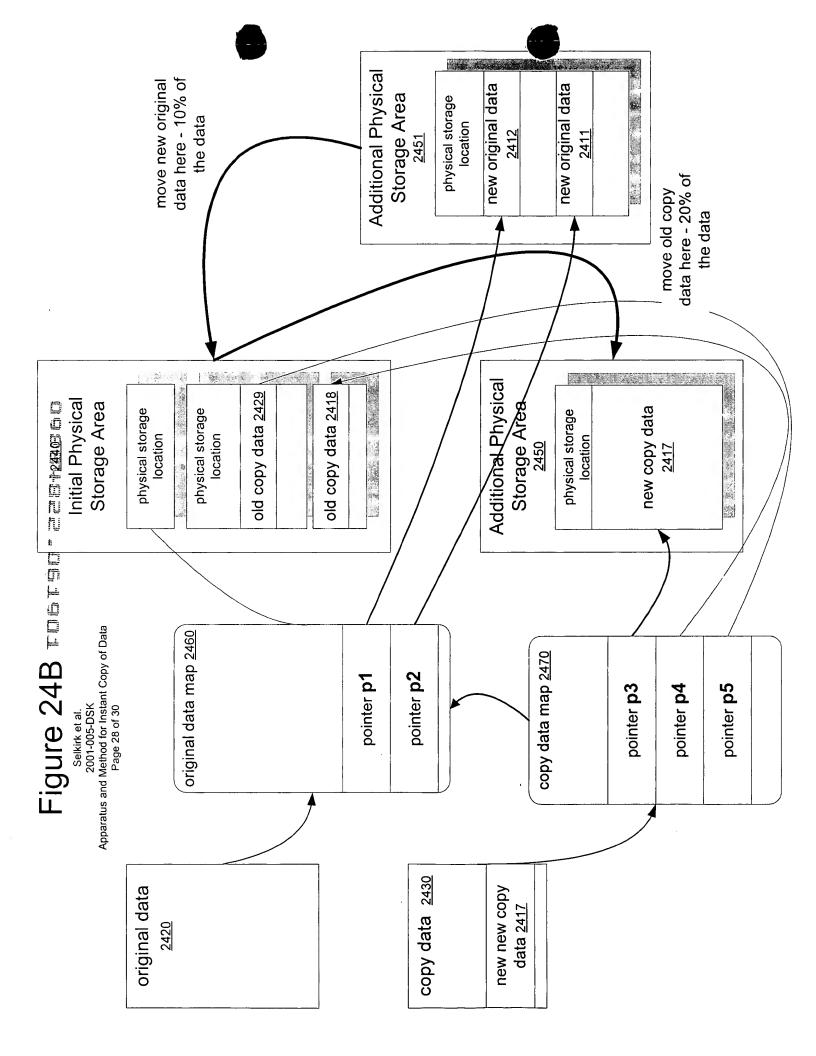


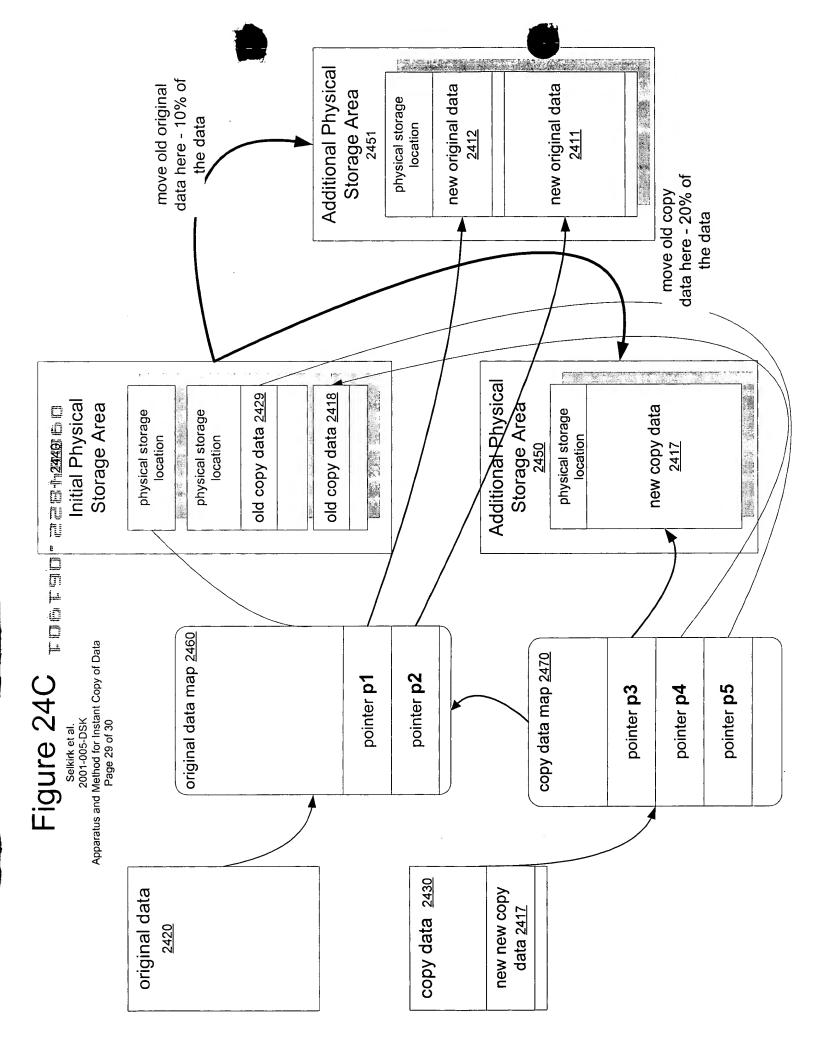












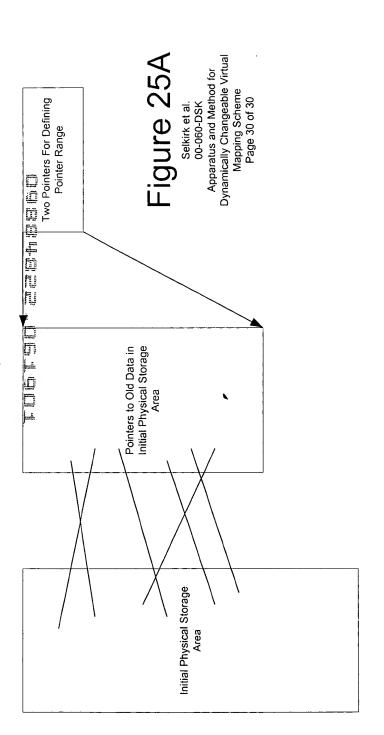
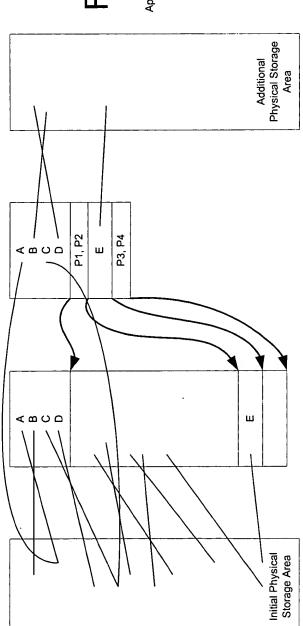


Figure 25B

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 30 of 30



Instant Copy Pointers

Pointers to Initial Physical Storage Area